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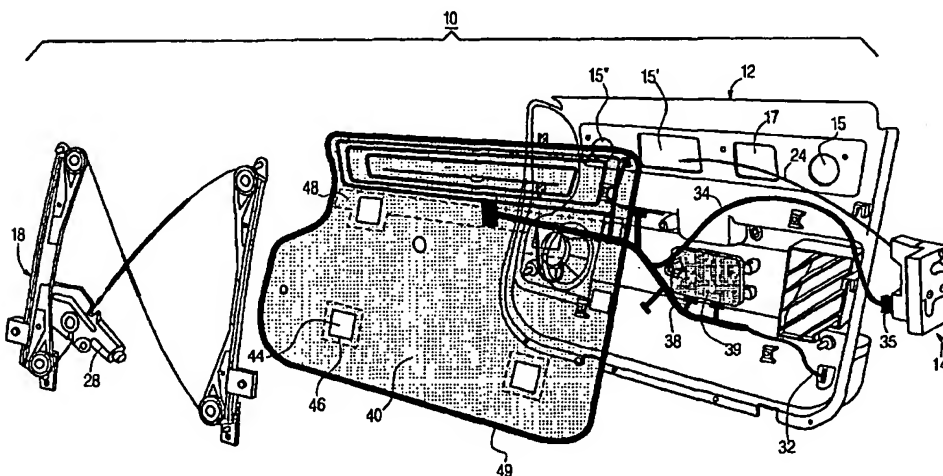
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(54) Title: NONSTRUCTURAL TRIM MODULE



(57) Abstract: A non-structural trim module (10) for a structural component of a vehicle, such as a vehicle door, includes a non-structural trim panel (12) and a wide variety of operational, convenience and design components attached at the trim module (10) manufacturing facility. In the preferred embodiment, the trim module (10) includes a single, integrated wire harness (26), a window actuator (18), a water barrier (40), and an integrated latch mini-module (14). The latter could alternatively be coupled to the vehicle door at the final assembly location.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

NONSTRUCTURAL TRIM MODULE

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] This application relates to trim panels of various types used in vehicles, including door trim panels, and trim panels for tailgates, lift gates, cargo doors, side panels, and the like. More particularly, the present invention relates to non-structural trim panels which include a variety of components and which become structural when attached to a vehicle component, such as a vehicle door. In the most preferred embodiment, the non-structural trim panel include such features as door trim, window regulators, speakers, a single wire harness, switches, lights, water and/or acoustical barriers, handles, a latch (which preferably is attached to the panel but which may be connected as a separate mini-module), and the like.

DESCRIPTION OF THE PRIOR ART

[0002] A large number of methods and systems for creating complete vehicle structures and trim modules are known in the art. For purposes of the present invention, the focus will be on doors, which are known to include a trim panel facing the vehicle interior, various water protective barriers, and a door which has a first inner surface for the attachment of the trim panel and a second outer surface. The present invention is not limited to door trim modules however, as the invention is also applicable to side trim modules, pillar trim modules, instrument panel trim modules, and the like. The door inner structure, in most vehicles, is made from steel or other metals or metal alloys, although various plastic components are becoming common door materials.

[0003] Most systems which include operational components on a door trim module are structural and include rigid metal frames, cross beams, molded in supporting structures, or the like. The door trim module is therefore itself

structural, and when combined with the door results in the completed door assembly. It is also known in various prior art systems that certain components can be added to door trim modules, such as speakers, door latches, handles, some electrical components and the like. For example, see European Published Application EP 1 043 182 A1 and U.S. Patent Nos. 4,882,842, and 4,648,208.

[0004] One feature which is commonly attached to the trim module is a latch. It is usually fully coupled to the electrical components and manual inside and outside door latch release mechanisms. If coupled to the trim module at the factory, a latch bracket is provided, and the combination of the latch and bracket add weight and complexity to the trim module, requiring the use of more complicated assembly processes. Moreover, one or two further steps are required with such prior trim panels, i.e., either removal of the latch from the bracket and/or sometimes the removal of the bracket from the panel. Additional issues with using latches shipped with the trim modules include the potential for grease migration onto the trim module, and the potential for latch damage since it is carried at the periphery of the trim module. In addition, the assembly of an installed latch to the door may create increased assembly time.

[0005] Water barriers are also known for vehicle doors, and in many instances they are individual plastic sheets which are sandwiched between the trim panel and the door structure at the time of final assembly.

[0006] Another problem with prior art structural trim modules known to the art, is that the structural components and integral reinforcements add weight, which can cause problems in assembly and add cost and manufacturing complexity, such as that caused by the added weight of a latch and bracket or other reinforcement methods.

[0007] A trim module system which is non-structural, but which includes a full array of operational, convenience and style components would represent a significant advance in this art.

FEATURES AND SUMMARY OF THE PRESENT INVENTION

[0008] The present invention features a non-structural trim module for vehicles.

[0009] A further feature of the present invention is to provide enhanced modularity to a nonstructural trim module by including a number of components such as a water barrier, a wire harness, a window actuator/regulator, a speaker and various handle and trim components.

[0010] Yet a further feature of the present invention is to reduce the weight of a trim module to the point that installation can be accomplished by hand and without the need for expensive robotic loading devices typically used for heavier structural parts and the personnel and maintenance associated therewith.

[0011] Another feature of the present invention is to provide a non-structural trim module which includes an integral latch or a separate latch mini-module which can be joined to the trim module at the door assembly facility.

[0012] Further features of the present invention relate to the removable attachment of a latch from the trim module and the potential elimination of a latch bracket.

[0013] A different feature of an alternate embodiment in the present invention is to provide a system in which damage to the trim module latch is avoided by having a separate latch mini-module which is connected at the time of final assembly.

[0014] A still further feature of an alternate embodiment of the present invention is to provide a trim module which reduces the potential for grease migration, because in such an embodiment, the latch is shipped separately from the trim module.

[0015] How the foregoing and other features of the invention are accomplished, individually, collectively, or in various subcombinations, will be described in the following description of the preferred and alternate embodiments of the invention, taken further with the FIGURES. Generally,

however, they are accomplished by providing a truly non-structural trim module for a vehicle which is joined to the vehicle at the next assembly station. A wide variety of components can be added to the non-structural module. These include, for example, in the case of a door trim module, such components as a wire harness(s), window and door actuators/regulators, water barriers, lights, speakers, switches, latches and locks, armrests, acoustical materials, handles, electronic modules, impact countermeasures, storage bins, HVAC components, and a wide variety of other electrical or mechanical functional or decorative components. In the most preferred embodiment, a non-structural door trim module is manufactured with a latch. In an alternate embodiment, a separate latch module is provided at the time of attachment of the trim module to the door, eliminating the need for a latch bracket and reducing the potential for latch damage or grease migration onto the trim during transportation and assembly. Use of the present invention can also facilitate hand installation of trim modules, thereby avoiding the need for expensive and complex robotic loading and assembly equipment.

[0016] Other ways in which the features of the invention are accomplished will appear to those skilled in the art after they have read this specification and reviewed the drawings. Such other ways are deemed to fall within the scope of the present invention if they fall within the scope of the claims which follow.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIGURE 1 is an inner view of a door trim module;

[0018] FIGURE 2 is a view showing a door trim module, a single mechanical connection to a latch mini-module, the trim module including a water barrier and other components;

[0019] FIGURE 3 is an exploded view of a window actuator, a water barrier, a latch mini-module, and a door trim module system, such as that shown in FIGURE 2 (without the window actuator);

[0020] FIGURE 4 is an exploded view, taken from the interior and showing a vehicle door, a latch mini-module, the trim module, and certain trim accessories; and

[0021] FIGURE 5 shows an alternate embodiment of the invention in which the water barrier sheet shown in earlier FIGURES is replaced by a seal which fits within a channel surrounding the sides and bottom of the trim module.

[0022] In the various FIGURES, like reference numerals will be used to indicate like components.

DESCRIPTION OF THE PREFERRED AND AN ALTERNATE EMBODIMENT

[0023] Before beginning the detailed description of the preferred and an alternate embodiment of the present invention, several general comments can be made about the applicability and scope of this invention. The term "non-structural" as used herein means that the trim module is not capable, until it is attached to a structural component of the vehicle, of carrying any primary crash loads, slam loads, consumer usage loads or window actuation loads, even though the trim panel itself is capable of carrying handling, shipping and non-operational loads created by the weight of regulators, handles, map pockets, wire harnesses, arm rests, and the like.

[0024] Operational loads for such trim module components can be up to several hundred pounds and for door systems include such loads as the pull load on a door strap, a user leaning on an armrest, pulling on the door latch, vertical window "break in" loads, and the like. The aforementioned U.S. Patent No. 4,882,842 discloses trim panels capable of absorbing such loads. In contrast, the trim panels of the present invention are truly non-structural and assure the independent and important functions of an aesthetic trim panel system and of the various mechanical and electrical components associated with fabrication and assembly. In the present invention all operational loads of the mechanical or electrical components are transferred directly to a structural vehicle part at the time the trim module is fastened thereto.

[0025] The trim module of the present invention is shown to include a number of operating, safety and convenience components. However, the invention is much broader than the illustrated embodiment, and once appreciated by those skilled in the art, the non-structural aspect of the trim module of the present invention can be adapted to a wide variety of vehicles and include other components used with the particular module, i.e., those which are used with prior art structural modules.

[0026] Second, the illustration show a latch mini-module, including mechanical couplings as would be used to connect the mini-module to an interior door release lever. Certain illustrations also show electrical connections of the mini-module to a wire harness within the trim module and additional connections from a single wire harness to various components such as switches, lights, window actuators, speakers, etc. It should be understood at the outset that the non-structural trim module of the present invention is preferably constructed with the latch as an integral part thereof or with a separate latch, and that the latch can be selected from a variety of known latches which can be operated electronically or by using keyless entry systems which are now becoming commonplace. Accordingly, the latch mechanism itself is not described in detail.

[0027] Components such as speakers, electronic window actuators, a door light, and a variety of other operating, convenience and design components are illustrated in the FIGURES, but these should not lead the reader to believe that the invention is limited to these types of door trim modules. Other components which may be located on the panels include door latch actuators, handles, electronic modules, air bag modules, impact countermeasures, storage bins, HVAC components, and the like. The non-structural trim panel of the present invention can also be applied to a wide variety of vehicle trim modules, including those used for liftgates, tailgates, cargo trim, side trim and other vehicle trim areas where a trim module is secured directly to the vehicle structure.

[0028] Furthermore, while the present invention is described in connection with two particular types of water barriers, the non-structural trim panel of the present invention may be used in systems which do not include any type of water barrier or with other types of water barriers than those specifically illustrated. One skilled in the art will readily appreciate the additional steps which may be necessary to prevent damage to electrical components, depending upon the type and location, and the presence or absence of water barrier elements.

[0029] Proceeding now to the description of the FIGURES, the trim module system 10 of the present invention includes a trim panel 12 and a latch mini-module 14. The trim panel 12 includes a main support panel 16 which supports a variety of operating, convenience and design components, several of which are illustrated in the FIGURES. For example, trim panel 12 includes a motorized window actuator 18 and a speaker 20. Holes 15 and 17 are provided for window actuator attachment, and to provide the ability to service and attach glass (not shown) and can be covered on the interior by trim components. Other holes are shown (15' and 15'') and additional holes could be provided at desired locations for a variety of assembly and service functions.

[0030] Shown at the upper portion of panel 16 is a manual operating latch 22 having a cable 24 extending therefrom. Cable 24 is coupled to mini-module 14 by any type of well-known, quick coupling device known to the art.

[0031] In addition to the mechanical coupling, the system 10 illustrated in FIGURE 1 includes a single wire harness 26 having a variety of electrical connections to certain components. For example, line 19 leads to speaker 20 and another line 27 couples the harness to the motor 28 and window actuator 18. A further line 29 couples the harness to the actuator buttons for the window device illustrated by reference 30. Another line 32 extends to a light 33 (shown best in FIGURE 4). Further, in connection with the mini-module 14, an electrical connection is made through line 34 to a quick connect coupler 35 which in turn is connected to a mating element on the rear of latch mini-module 14. This connection can be used to lock or unlock the vehicle in response to a

switch 31, located adjacent the driver, or in response to a signal generated by a receiver of a keyless entry system, such as the keyfob devices which are well known in the art. Lines 38 are connected to a door node electronics module 39. While a single wire harness 26 is shown in the FIGURES, more than one wire harness can be included for trim module system 10, or a single wire harness used in system 10 can include branches extending to other vehicle components located in other trim panel systems or located elsewhere on the vehicle.

[0032] FIGURE 2 shows some of the components shown in FIGURE 1, and additionally shows a water barrier 40 attached by patches of adhesive 46 and 48. The adhesive surrounds openings 42, which in turn surround the mounts 44 for the window actuator. In addition, a seal 49, such as a cut, molded, or extruded bead of polyurethane foam, surrounds the periphery of water barrier 40. It is adhered, for example by heat or by adhesive to the outer surface of the water barrier 40, and is compressed against the inner surface of the door as will become more apparent as the description continues. The seal may include certain chemical treatments on its outer surface to prevent wicking of water into the area between the door and the water barrier, such chemical treatments including such materials as Teflon®, wax, silicones, scrim, adhesives and the like.

[0033] An exploded view of the components shown in FIGURES 1 and 2 is provided in FIGURE 3. Here it can be easily appreciated how the openings 44 are surrounded by adhesive 46 and 48. Moreover, the window actuator is shown as it would be mounted to the door panel 12 after water barrier 40 is applied thereto.

[0034] Proceeding next to FIGURE 4, a door 50 (or other structural component of the vehicle) is illustrated adjacent system 10. It will be noted that the door 50 includes an inner reinforcement structure 52 against which the seal 49 would be urged during assembly. Fasteners, in and of themselves are well known in the art and would extend through openings 53 and into receiving openings 54 to secure panel 12 to door 50.

[0035] Another embodiment of the invention is illustrated in FIGURE 5 where a trim module 60 include a trim panel 62 along with the latch mini-module 14. Many of the components are the same, such as the speaker 20, but a different style window actuator 18 is shown, this one with a different motor location as indicated at 28'. Moreover, instead of having a sheet of water barrier material over the inner surface of panel 62, panel 62 includes a channel which extends around both sides and the bottom. The channel includes five (in the illustrated embodiment) generally U-shaped humps 66 which surround opening 67 used for the fasteners. A seal 68 having raised portions 69 fits within channel 65 and over humps 66 to provide a seal against water intrusion into the area between the trim panel 62 and a door structure. Since there is more opportunity for water to come into contact with trim panel components in the embodiment shown in FIGURE 5, some of the electrical components can be covered by protective coatings when using this embodiment.

[0036] The latch mini-module 14, in addition to the couplings which are shown in the FIGURES, can include additional couplings to an outside handle, and also mounting structures for anti-theft shrouds as will be appreciated by those familiar with the vehicle door fabrication art.

[0037] It will also be appreciated from the FIGURES that the latch mini-module 14 may be shipped separately from trim panel 12 and assembled to the connectors (24, 35 and others discussed but not specifically shown) either immediately prior to or even after installation of the trim panel at the assembly plant. The various benefits described in connection with the features of the present invention are accomplished in that the overall weight of the trim panel 12 is reduced, grease migration is prevented, speed of assembly can be enhanced, damage to the mini-module 14 during shipment is prevented, and in the illustrations, there is no latch bracket shown on trim panel 12, as would be the case with current practice. In another embodiment, the latch mini-module 14 is removably coupled to the inside surface of the trim panel 12 and is removed therefrom and installed in the vehicle at the assembly location.

[0038] An additional trim piece (not shown) extends across the bottom of trim panel 12 to cover the fastener attachment openings. Moreover, the illustrations do not show acoustical panels because the other components can be shown more easily without them. However, acoustical components can be included in the door or between the door and the inner surface of panel 16 to reduce road noise and the like.

[0039] While the invention has been shown and described in connection with a particularly preferred embodiment, it is not to be limited thereby but is to be limited solely by the scope of the claims which follow.

WHAT IS CLAIMED IS:

- 1 1. A trim module for a vehicle comprising at least one non-structural
2 trim panel adapted to be attached to a structural component of a vehicle and at
3 least one component located on each panel.
- 1 2. The trim module of claim 1, wherein the trim module is selected
2 from the group consisting of door, pillar, cargo, liftgate, tailgate, and side trim
3 module.
- 1 3. The trim module of claim 1, wherein a component is a window
2 actuator.
- 1 4. The trim module of claim 1, wherein the trim panel is a door trim
2 module.
- 1 5. The trim module of claim 1, wherein the structural component is an
2 inner reinforcement structure.
- 1 6. The trim module of claim 1, wherein one or more components are
2 selected from the group consisting of wire harnesses, window actuators, door
3 latch actuators, window regulators, water barriers, lights, switches, latches,
4 speakers, locks, arm rests, handles, electronic modules, air bag modules, impact
5 countermeasures, storage bins, HVAC components, and acoustical material.
- 1 7. The trim module of claim 6, wherein the component is at least one
2 wire harness having a coupling to at least one other component.
- 1 8. The trim module of claim 1, wherein the component is a door latch
2 actuator, but a door latch module is not attached to the trim panel.
- 1 9. The trim module of claim 8, wherein the trim panel does not include
2 a door latch module bracket.

1 10. The trim module of claim 1 further including a mini-module latch
2 adapted to be connected to a component of the trim panel.

1 11. The trim module of claim 1, wherein the component is a water
2 barrier adapted to prevent water from reaching the trim panel after the trim
3 module has been attached to the vehicle.

1 12. The trim module of claim 4, further including a window actuator
2 and at least one access hole to provide the ability to service and attach glass.

1 13. A method of assembling a trim module to a vehicle comprising the
2 steps of:

3 Providing a non-structural trim panel adapted to be attached to a
4 structural component of a vehicle, the trim panel including at least one
5 component; and

6 Fastening the non-structural trim module to the structural
7 component of the vehicle.

1 14. The method of claim 13, comprising the further steps of attaching
2 a window regulator using access holes in the trim.

1 15. The method of claim 14, comprising the subsequent step of
2 covering the holes with a trim component.

1 16. The method of claim 13, wherein the trim module is selected from
2 the group consisting of door, pillar, cargo, liftgate, tailgate, and side trim panels.

1 17. The method of claim 13, wherein one or more components are
2 selected from the group consisting of wire harnesses, window actuators, door
3 latch actuators, window regulators, water barriers, lights, switches, latches,
4 speakers, locks, arm rests, handles, electronic modules, air bag modules, impact
5 countermeasures, storage bins, HVAC components, and acoustical material.

1 18. The method of claim 13, wherein the trim module is a door trim
2 module and the method includes the further step of combining a door latch
3 module with the trim panel prior to fastening the trim module to the vehicle.

1 19. A method of reducing damage to a door trim panel during shipment
2 and assembly thereof to a vehicle door comprising the steps of:
3 providing a non-structural trim panel including a door latch actuator
4 and a separate door latch module; and
5 transporting the trim panel to the location of assembly.

1 20. The method of claim 19, comprising the further step of connecting
2 the latch module to the latch actuator and wherein the connecting step takes
3 place prior to the time the trim panel is assembled to the vehicle door.

1 21. The method of claim 19, wherein the latch module is connected to
2 the vehicle door.

1 22. A method of reducing damage to a door latch of the type found on
2 vehicle door trim panels comprising the steps of:
3 providing a non-structural door trim panel and a separate door latch
4 module; and
5 connecting the latch module to the trim panel at a location remote
6 from the location of fabrication of the trim panel.

1 23. The method of claim 22, wherein the damage prevented includes
2 grease migration from the latch module to the trim panel during shipment of the
3 trim panel to the remote location.

1 24. The method of claim 23, wherein the remote location is the
2 location where the trim panel is assembled to the vehicle door.

1 25. The method of claim 24, wherein the latch module is connected to
2 the vehicle door.

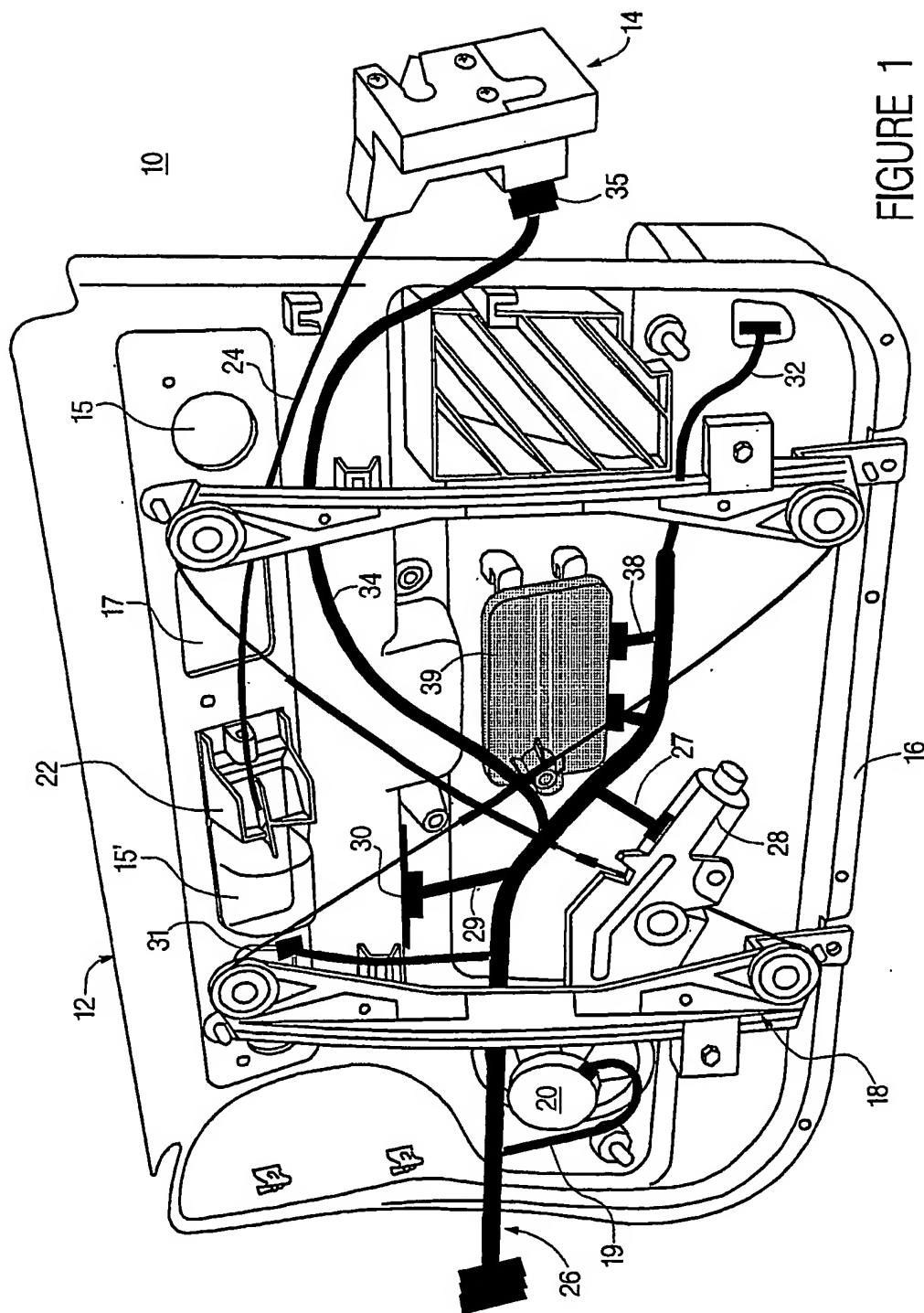
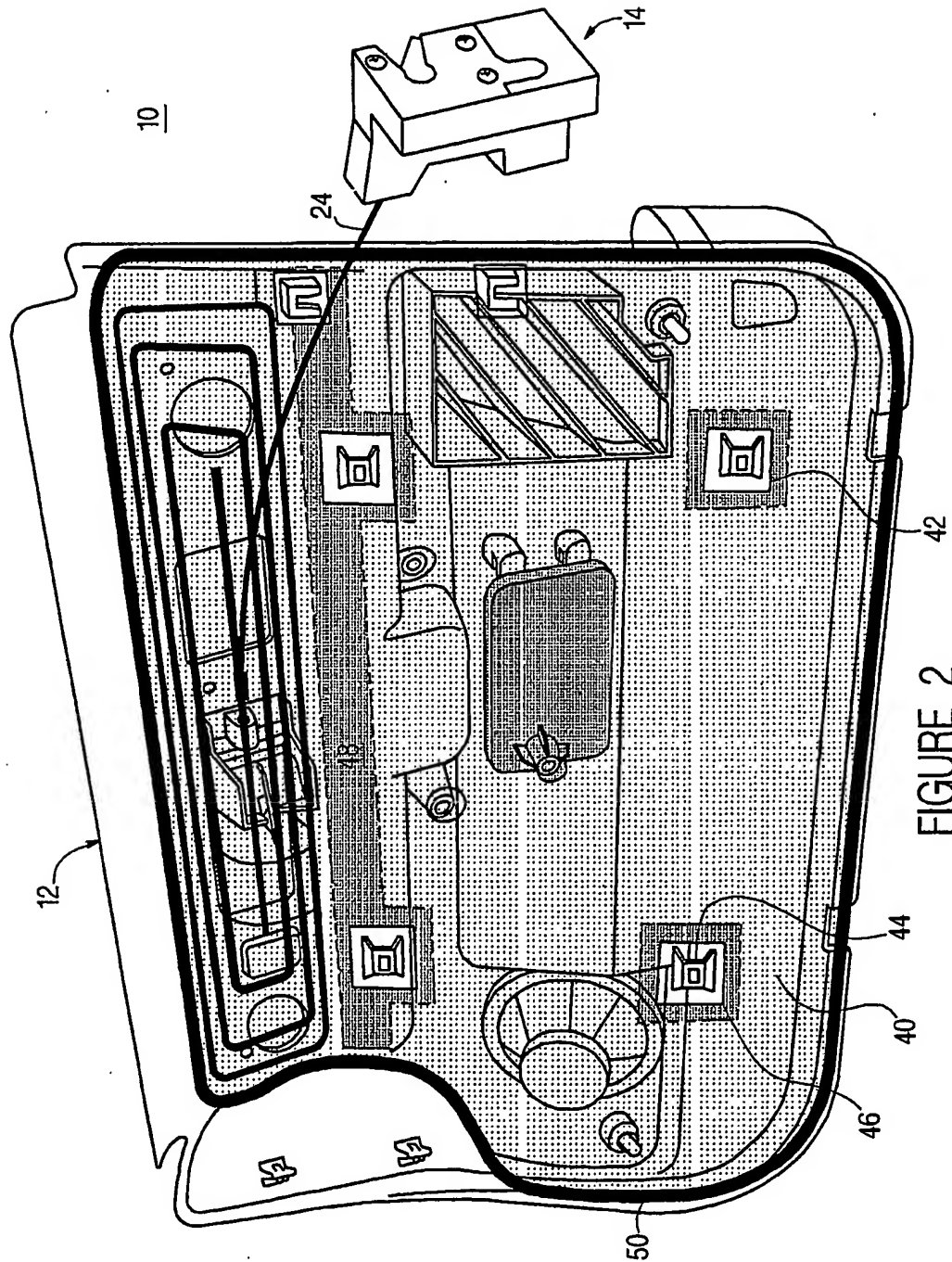


FIGURE 1



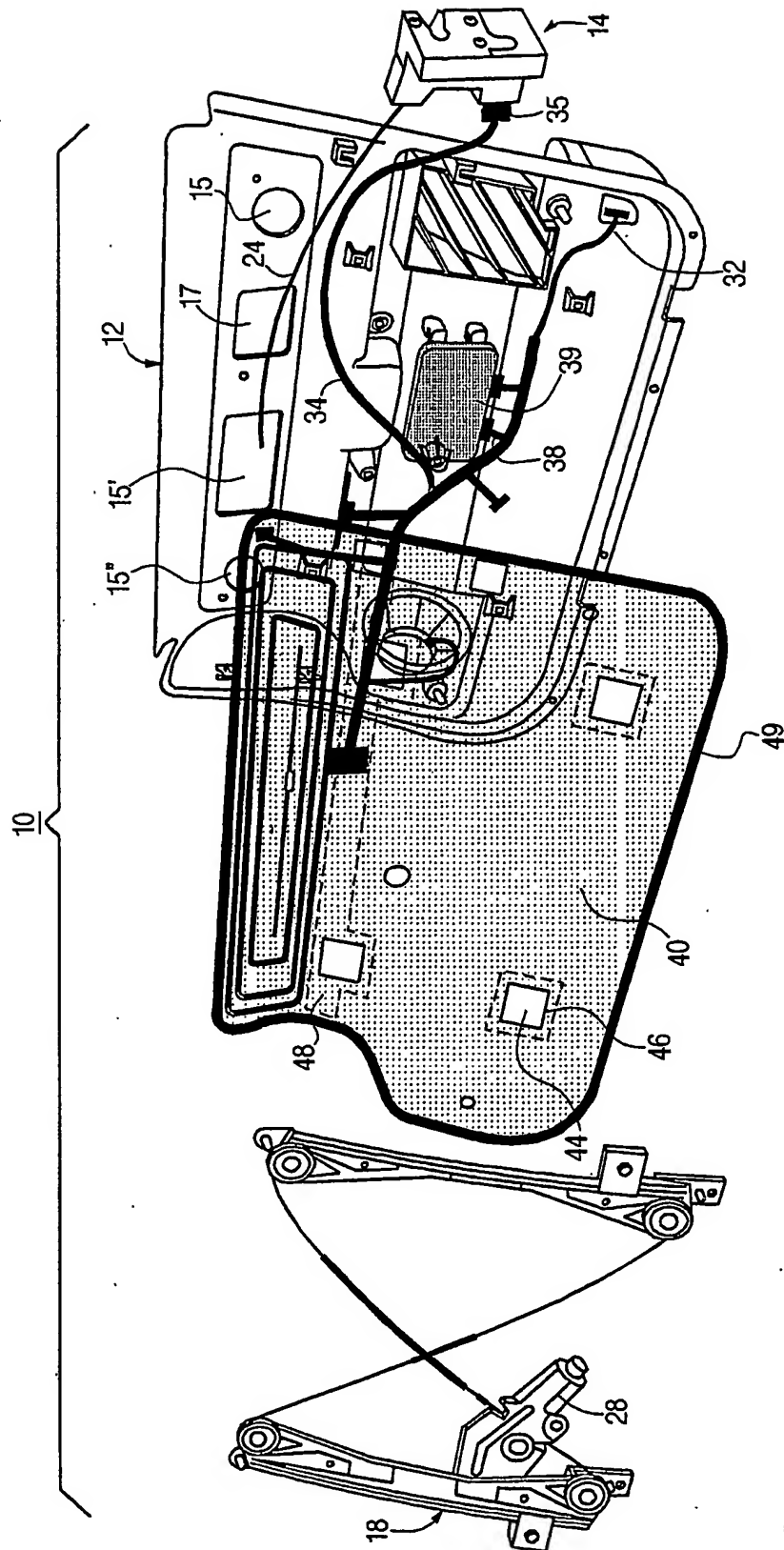


FIGURE 3

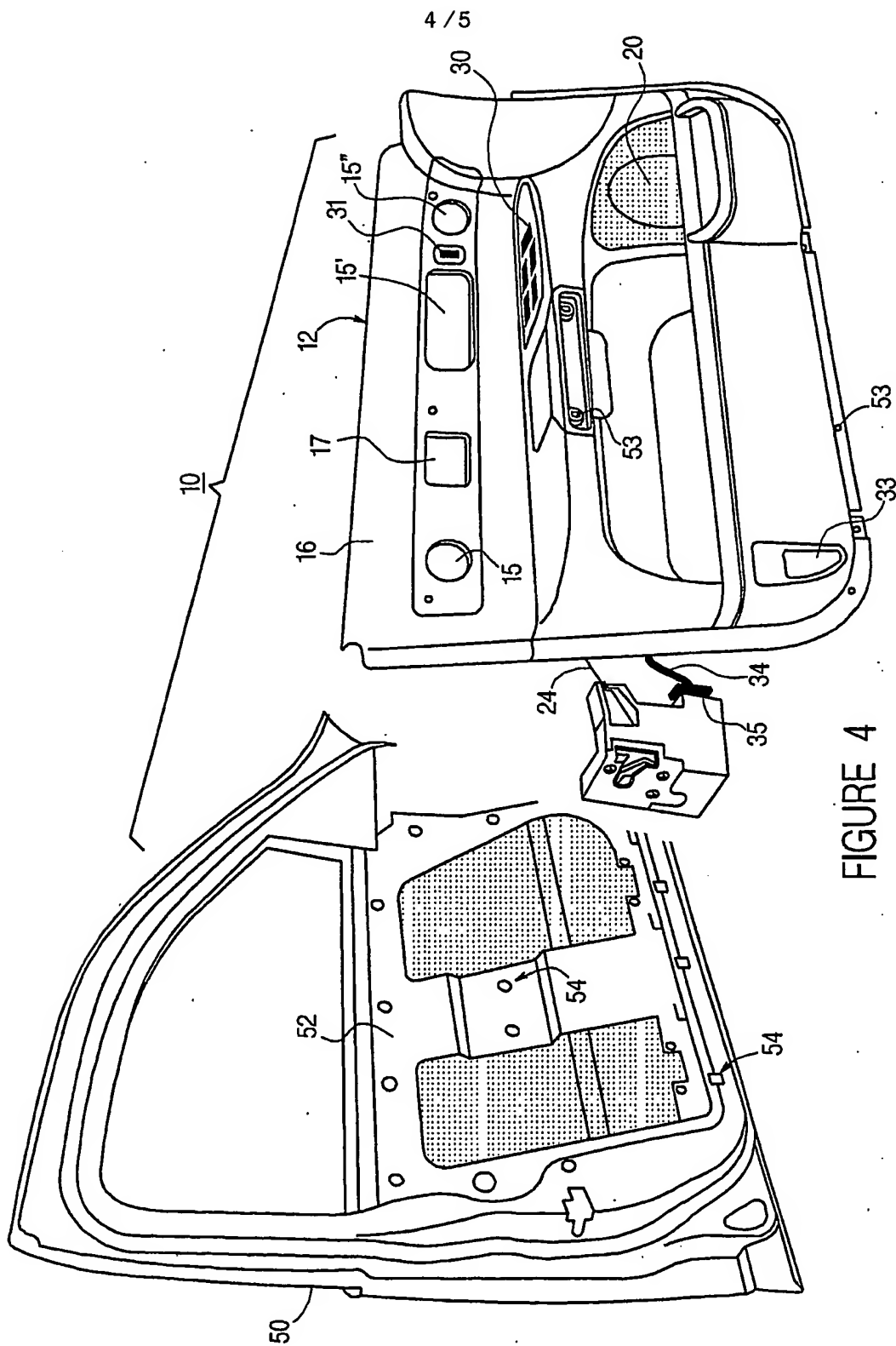


FIGURE 4

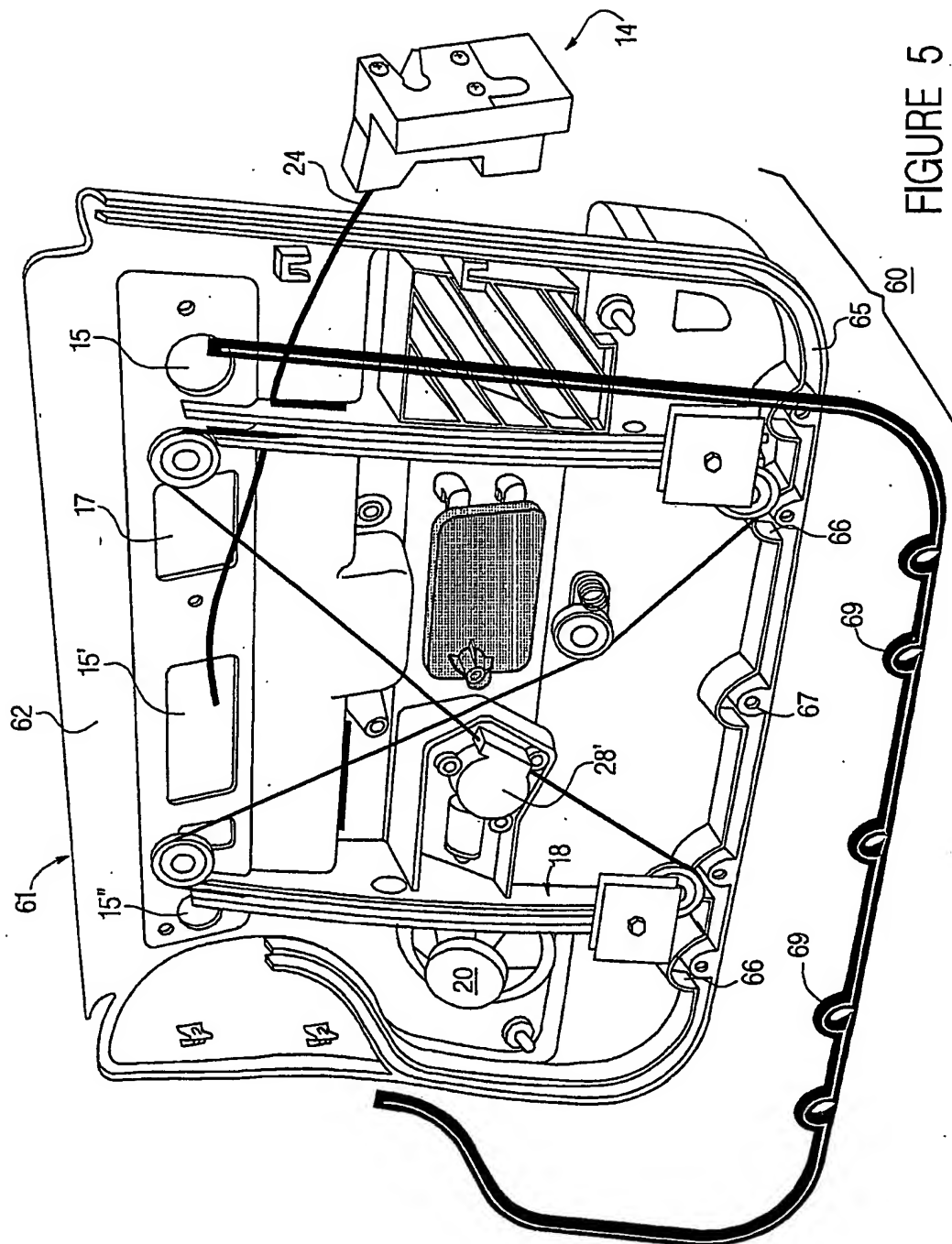


FIGURE 5

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/31465

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B60J5/04 B60J5/10 B60R13/02 B62D65/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B60J B60R B62D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

5 February 2003

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17/02/2003

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INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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